What is claimed is:

1. A body implantable system, comprising:

a lead system comprising an elongated body, an open lumen, and at least one electrode at a distal end of the lead system;

a sensing catheter movably disposed within the open lumen of the lead system, a distal tip of the sensing catheter extending beyond a distal tip of the lead system, the sensing catheter comprising at least one thermal sensor at a distal end of the sensing catheter; and

a detector/energy delivery system coupled to the lead system, the detector/energy delivery system sensing ventricular rhythms from the at least one electrode and sensing blood temperature from the at least one thermal sensor, the detector/energy delivery system delivering an electrical signal to the at least one electrode.

2. The system of claim 1, wherein the thermal sensor comprises a thermistor.

3. The system of claim 1, wherein the thermal sensor comprises a MEMS temperature sensor.

4. The system of claim 1, wherein the thermal sensor comprises a thermocouple.

5. The system of claim 1, wherein the thermal sensor comprises a fiber optic temperature probe.

10036530.121401

6. The system of claim 1, wherein the detector/energy delivery system modifies the delivery of electrical signals based on the sensed blood temperature.

7. The system of claim 1, further comprising a flow sensor for sensing a cardiac output, and wherein the detector/energy delivery system further senses a left ventricular flow rate from the flow sensor.

8. The system of claim 7, wherein the flow sensor comprises a ventricular impedance sensor.

9. The system of claim 7, wherein the detector/energy delivery system determines a hemodynamic efficiency of the heart using the sensed left ventricular flow rate and the sensed blood temperature.

10. The system of claim 7, wherein the detector/energy delivery system modifies the delivery of electrical signals based on the sensed left ventricular flow rate and the sensed blood temperature.

11. The system of claim 1, further comprising a ventricular thermal sensor for sensing a blood temperature entering the left ventricle, the ventricular thermal sensor coupled to the detector/energy delivery system, and wherein the detector/energy delivery system further senses a temperature difference between the ventricular thermal sensor and the at least one thermal sensor at a distal end of the sensing catheter.

12. The system of claim 11, wherein the detector/energy delivery system determines a hemodynamic efficiency of the heart using the sensed temperature difference.

10035539.121301

13. The system of claim 11, wherein the detector/energy delivery system modifies the delivery of electrical signals based on the sensed temperature difference.

14. The system of claim 1, further comprising an activity sensor coupled to the detector/energy delivery system.

15. The system of claim 14, wherein the activity sensor comprises an accelerometer.

16. The system of claim 14, wherein the activity sensor comprises a minute ventilation sensor.

17. The system of claim 14, wherein the detector/energy delivery system updates a long term average blood temperature measurement from the at least one thermal sensor, the long term average blood temperature updated at a state of rest as sensed by the activity sensor.

18. A method of pacing a patient's heart, comprising:

providing a lead system into a coronary vein of a left ventricle of the patient's heart, the lead system comprising:

an elongated body;

at least one electrode at a distal end of the lead system; and

at least one thermal sensor at a distal end of the lead system;

providing a flow sensor in the patient's heart, the flow sensor sensing cardiac output;

sensing ventricular electrical rhythms at the at least one electrode; and

sensing a coronary vein blood temperature from the at least one thermal sensor and sensing a left ventricular flow rate from the flow sensor to adaptively modify delivery of synchronized electrical signals delivered to the patient's heart.

19. The method of claim 18, wherein the thermal sensor comprises a thermistor.

20. The method of claim 18, wherein the thermal sensor comprises a MEMS temperature sensor.

21. The method of claim 18, wherein the thermal sensor comprises a thermocouple.

22. The method of claim 18, wherein the thermal sensor comprises a fiber optic temperature probe.

23. The method of claim 18, wherein the flow sensor comprises a ventricular impedance sensor.

24. The method of claim 18, wherein adaptively modifying the delivery of synchronized electrical signals further comprises determining hemodynamic efficiency using the sensed coronary vein blood temperature and the sensed left ventricular flow rate.

25. The method of claim 18, further comprising measuring a coronary vein blood temperature from the at least one thermal sensor to update a long-term average coronary vein temperature.

26. The method of claim 25, further comprising providing an activity sensor implantable within the patient, and wherein updating a long-term average coronary vein temperature further comprises updating a long-term average coronary vein temperature at a state of rest as sensed by the activity sensor.

27. The method of claim 25, wherein adaptively modifying the delivery of synchronized electrical signals further comprises comparing a measured coronary vein blood temperature with the long-term average coronary vein temperature.

28. The method of claim 18, further comprising providing a ventricular thermal sensor for sensing a blood temperature entering the left ventricle, and wherein adaptively modifying delivery of synchronized electrical signals delivered to the patient's heart further comprises sensing a temperature difference between the ventricular thermal sensor and the at least one thermal sensor at a distal end of the lead system.

29. A method of pacing a patient's heart, comprising:

providing a lead system into a vein of the patient's heart, the lead system comprising:

an elongated body;

an open lumen; and

at least one electrode at distal end of the lead system;

providing a sensing catheter within the open lumen of the lead system until a distal tip of the sensing catheter extends beyond a distal tip of the lead system, the sensing catheter comprising at least one thermal sensor at a distal end of the sensing catheter;

measuring ventricular electrical rhythms from the at least one electrode; and

measuring a coronary vein blood temperature from the at least one thermal sensor to adaptively modify delivery of the synchronized electrical signals delivered to the patient's heart.

30. The method of claim 29, wherein the thermal sensor comprises a thermistor.

31. The method of claim 29, wherein the thermal sensor comprises a MEMS temperature sensor.

32. The method of claim 29, wherein the thermal sensor comprises a thermocouple.

33. The method of claim 29, wherein the thermal sensor comprises a fiber optic temperature probe.

34. The method of claim 29, further comprising providing a flow sensor in the patient's heart, the flow sensor sensing cardiac output.

35. The method of claim 34, wherein the flow sensor comprises a ventricular impedance sensor.

36. The method of claim 34, wherein adaptively modifying the delivery of the synchronized electrical signals further comprises measuring a left ventricular flow rate from the flow sensor.

37. The method of claim 34, wherein adaptively modifying the delivery of synchronized electrical signals further comprises determining a hemodynamic

10035659.122101

efficiency from the coronary vein blood temperature and the left ventricular flow rate.

38. The method of claim 29, further comprising measuring a coronary vein blood temperature from the at least one thermal sensor to update a long-term average coronary vein temperature.

39. The method of claim 38, further comprising providing an activity sensor implantable within the patient, and wherein updating a long-term average coronary vein temperature further comprises updating a long-term average coronary vein temperature at a state of rest as sensed by the activity sensor.

40. The method of claim 38, wherein adaptively modifying the delivery of synchronized electrical signals further comprises comparing a measured coronary vein blood temperature with the long-term average coronary vein temperature.

41. The method of claim 29, further comprising providing a ventricular thermal sensor for sensing a blood temperature entering the left ventricle, and wherein adaptively modifying delivery of synchronized electrical signals delivered to the patient's heart further comprises sensing a temperature difference between the ventricular thermal sensor and the at least one thermal sensor at a distal end of the sensing catheter.

42. A body implantable system, comprising:

a lead system comprising:

an elongated body suitable for positioning into a coronary vein;

at least one electrode at a distal end of the elongated body;

a thermal sensor located proximal to the distal end of the elongated body, the thermal sensor for sensing an average coronary sinus blood temperature at a location distal to the coronary sinus ostium when the at least one electrode is positioned in a coronary vein; and

a programmable circuit coupled to the lead system, the programmable circuit determining a hemodynamic state from the sensed average coronary sinus blood temperature.

43. The system of claim 42, wherein the thermal sensor comprises a thermistor.

44. The system of claim 42, wherein the thermal sensor comprises a MEMS temperature sensor.

45. The system of claim 42, wherein the thermal sensor comprises a thermocouple.

46. The system of claim 42, wherein the thermal sensor comprises a fiber optic temperature probe.

47. The system of claim 42, further comprising an energy delivery system coupled to the programmable circuit, and wherein the energy delivery system modifies the delivery of electrical signals based on the sensed blood temperature.

48. The system of claim 42, further comprising a flow sensor for sensing a cardiac output, and wherein the programmable circuit further senses a left ventricular flow rate from the flow sensor.

49. The system of claim 48, wherein the flow sensor comprises a ventricular impedance sensor.

50. The system of claim 48, wherein the programmable circuit determines a hemodynamic efficiency of the heart using the sensed left ventricular flow rate and the sensed blood temperature.

51. The system of claim 48, further comprising an energy delivery system coupled to the programmable circuit, and wherein the energy delivery system modifies the delivery of electrical signals based on the sensed left ventricular flow rate and the sensed blood temperature.

52. The system of claim 42, further comprising a ventricular thermal sensor for sensing a blood temperature entering the left ventricle, the ventricular thermal sensor coupled to the programmable circuit, and wherein the programmable circuit further senses a temperature difference between the ventricular thermal sensor and the thermal sensor.

53. The system of claim 52, wherein the programmable circuit determines a hemodynamic efficiency of the heart using the sensed temperature difference.

54. The system of claim 52, further comprising an energy delivery system coupled to the programmable circuit, and wherein the energy delivery

system modifies the delivery of electrical signals based on the sensed temperature difference.

55. The system of claim 42, further comprising an activity sensor coupled to the programmable circuit.

56. The system of claim 55, wherein the activity sensor comprises an accelerometer.

57. The system of claim 55, wherein the activity sensor comprises a minute ventilation sensor.

58. The system of claim 55, wherein the programmable circuit updates a long term average blood temperature measurement from the at least one thermal sensor, the long term average blood temperature updated at a state of rest as sensed by the activity sensor.

10036639.123101